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ABSTRACT

The Scientists and Engineers Statistical Data System (SESTAT) is a comprehensive and integrated system of information about scientists and engineers in the United States. It comprises data collected through three national sample surveys supported by the National Science Foundation (NSF): The National Survey of College Graduates, the National Survey of Recent College Graduates, and the Survey of Doctorate Recipients. The SESTAT integrated database captures that part of the science and engineering population that either received a college degree in a science or engineering field, or those who work in a science or engineering occupation with a bachelor's degree or higher in any field. The SESTAT database features labor force and other work-related information, educational information, and family and demographic information. (WRM)

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A Tool for Studying Scientists and Engineers in the United States

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A Tool for Studying Scientists and Engineers in the United States

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GLOSSARY

The following terms are used extensively in the document. While some of the definitions are standard, others are specific to the SESTAT system.

***Employed:** Includes those who did any work for pay or profit during the survey reference week.

***Unemployed:** Includes those who did not have a job during the survey reference week, but had actively looked for work in the prior four weeks.

***Labor force:** Includes those who are employed or unemployed.

***Not in labor force:** Includes those who had no job during the survey reference week and were not looking for one (e.g. they may be retired, etc.)

Highest degree type: Level of highest degree received: bachelor's, master's, doctorate or professional.

Highest degree field: Field of study of highest degree. If an individual has two or more degrees at the same highest degree level, the highest degree field will be that of the most recent degree earned.

Science and Engineering (S&E): The National Science Foundation has developed a unique definition of S&E. Very broadly, educational fields considered to be S&E include computer and mathematical sciences, life sciences, physical sciences, social sciences, and engineering. Occupational categories considered to be S&E include computer and mathematical scientists, life scientists, physical scientists, social scientists, and engineers. All other educational fields and occupational categories are considered non-S&E by NSF. A more detailed definition of S&E and non-S&E educational fields and occupational categories can be found in Appendix Table 1.

Educated in S&E: Includes those who have earned at least one degree (at the bachelor's level or higher) in a science or engineering field.

Working in S&E: Includes those who were working in a science or engineering occupation during the survey reference week, regardless of education.

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*These definitions are based on those used by the Bureau of Labor Statistics. For further information, see http://stats.bls.gov:80/cps_faq.htm.

SESTAT: A Tool for Studying Scientists and Engineers in the United States

Within the U.S. population exists a group of individuals generically referred to as scientists and engineers. This group includes both people educated in science and engineering (S&E) fields and individuals who, although not educated in these fields, are working in S&E occupations. They include among their number technicians and technologists, researchers, educators, and managers of the S&E enterprise. Although these workers constitute only a small fraction of the total U.S. labor force, their impact on our society exceeds their number. Scientists and engineers contribute to technological innovation and economic growth, to scientific and engineering research, and to a greater understanding of S&E.

Determining the population of scientists and engineers in the U.S. can be dramatically affected by the criteria used to define this group. Educational degree levels and fields, occupational categories, or a combination of these factors may all be taken into account. To better define and understand this population, the National Science Foundation (NSF) developed the Scientists and Engineers Statistical Data System, or SESTAT ('*SEE-stat*').

SESTAT was designed in response to recommendations of the National Research Council's Committee on National Statistics (CNSTAT). The committee, with support from NSF, was asked in the late 1980s to conduct a comprehensive review of the NSF's surveys and data on scientists and engineers and to propose methods and procedures for increasing the quality and usefulness of the data in the 1990s. As NSF was expecting to draw a new sample of experienced scientists and engineers from the 1990 decennial census, the opportunity was provided to examine the design and operation of NSF's S&E data system. The committee's analyses and recommendations for the data system were presented in their 1989 report Surveying the Nation's Scientists and Engineers: A Data System for the 1990s. As one of its principal proposals, CNSTAT stated:

> *"We strongly urge that the NSF personnel data system for the 1990s strive to provide information that will permit users to apply their own definitions of the science and engineering population to suit their particular research and analysis purposes within a framework that facilitates cross-comparisons with other widely used data sources. Specifically, we believe that the system should support analysis of the science and engineering community from each of two major perspectives... from the perspective of occupational employment or jobs and from the perspective of academic training or careers."*

The NSF has strongly endorsed this recommendation and it has served as the guiding principle in the design and development of SESTAT.

What Is SESTAT?

SESTAT is a comprehensive and integrated system of information about the employment, educational, and demographic characteristics of scientists and engineers in the United States. It comprises data collected through three national sample surveys supported by NSF: the National Survey of College Graduates (NSCG), the National Survey of Recent College Graduates (NSRCG), and the Survey of Doctorate Recipients (SDR). These surveys are conducted biennially; each is administered to a different sample population of bachelor's and above college degree holders. Although there are individuals in the U.S. who have earned science and engineering related degrees at the associate's degree level or who do not have bachelor's degrees but are working in science and engineering occupations, these individuals are not included in the sampling frames for the three SESTAT surveys.

The National Survey of College Graduates

The NSCG was first administered in 1993 and biennially thereafter to a nationally representative sample of all college degree holders who were identified through the 1990 decennial census. The target population for this survey includes individuals in the United States as of April 1990 with a bachelor's degree or higher in any field, not just the sciences or engineering. Besides capturing people with degrees earned at U.S. institutions, the NSCG also includes college degree holders who earned their degrees outside of the United States but who were residing here in 1990. In 1993, two selected groups from the NSCG were incorporated into the SESTAT database: those with science or engineering

Table 1. Who is represented in the SESTAT integrated database?

Survey	1993 SESTAT	1995 SESTAT	1997 SESTAT
National Survey of College Graduates	Bachelor's level and above S&E degree holders as of April 1990, except those with U.S.-earned doctorates Bachelor's level and above non-S&E degree holders as of April 1990 who hold S&E jobs, except those with U.S.-earned doctorates	Bachelor's level and above S&E degree holders as of academic year 1994, except those with U.S.-earned doctorates Bachelor's level and above non-S&E degree holders as of April 1990 who hold S&E jobs, except those with U.S.-earned doctorates	Bachelor's level and above S&E degree holders as of academic year 1996, except those with U.S.-earned doctorates Bachelor's level and above non-S&E degree holders as of April 1990 who hold S&E jobs, except those with U.S.-earned doctorates
National Survey of Recent College Graduates	Individuals who earned bachelor's or master's S&E degrees in May to December of 1990, or academic years 1991 or 1992	Individuals who earned bachelor's or master's S&E degrees in academic years 1993 or 1994	Individuals who earned bachelor's or master's S&E degrees in academic years 1995 or 1996
Survey of Doctorate Recipients	Individuals who earned S&E doctorates in the U.S. through academic year 1992	Individuals who earned S&E doctorates in the U.S. through academic year 1994	Individuals who earned S&E doctorates in the U.S. through academic year 1996

SOURCE: National Science Foundation, Division of Science Resources Studies.

degrees, and those without such degrees but working in S&E occupations. These two populations are collectively referred to as the NSCG S&E panel.[1] In 1995 and subsequent rounds of the survey, these same two groups were followed.

The National Survey of Recent College Graduates

A second survey, the NSRCG – which has been administered biennially since the early 1970s to recent S&E bachelor's and master's degree recipients – is used to incorporate new U.S. S&E degree earners in the 1990s. In 1993, the NSRCG consisted of a sample of individuals who earned new S&E bachelor's and master's degrees in the 1990, 1991, and 1992 academic years. In 1995, these 1993 sample cases were moved into the NSCG sample frame; the 1995 NSRCG includes only recent U.S. S&E bachelor's and master's degree earners from the 1993 and 1994 academic years. The 1995 NSRCG sample was passed to the NSCG for the 1997 survey round; the 1997 NSRCG includes new U.S. S&E bachelor's and master's degree earners from the 1995 and 1996 academic years.

The Survey of Doctorate Recipients

A third survey, the Survey of Doctorate Recipients, has been sponsored by the National Science Foundation and other federal agencies since the early 1970s. In this survey, a sample of holders of S&E doctorates earned at U.S. institutions are followed throughout their careers from year of degree award until age 75. Every 2 years, a sample of new S&E doctoral degree earners is added to the SDR from another NSF-sponsored survey, the Survey of Earned Doctorates. In 1993, the SDR sample frame included all U.S.-earned S&E doctorates through academic year 1992; the 1995 sample frame includes doctorates earned through the 1994 academic year; the 1997 sample frame includes doctorates earned through the 1996 academic year.

The SESTAT Integrated Database

The SESTAT database was created by the integration of the S&E Panel of the NSCG, the NSRCG, and the SDR. Table 1 is a summary of the populations included in these three component surveys of the SESTAT integrated database. Because after 1993 the SESTAT surveys identify individuals for inclusion only at the point of earning a new S&E degree from a U.S. institution, two subpopulations of scientists and engineers in the United States are underrepresented in the SESTAT integrated database in 1995 and subsequent survey years: (1) new immigrants with S&E degrees earned outside the U.S. who entered the U.S. after 1990, and (2) people with no S&E degrees working in S&E occupations after 1990.

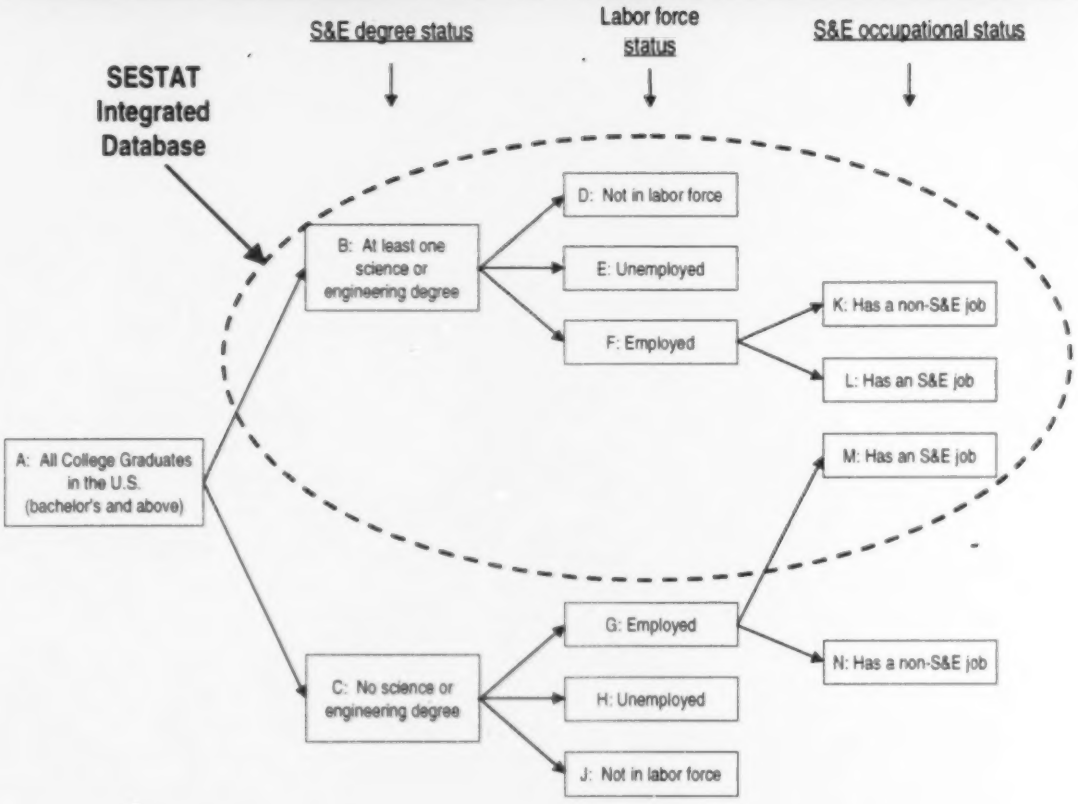
[1] For 1993, the full NSCG file (which includes all college degree holders, both S&E and non-S&E) is available for analysis. This file can be obtained on CD-ROM, or accessed through the SESTAT web site.

How Many Persons are Included in SESTAT?

The SESTAT integrated database captures that part of the science and engineering population who either received a college degree (bachelor's or higher) in an S&E field or those who work in an S&E occupation with a bachelor's degree or higher in any field. This is a broad designation that includes many fields of study, as well as many occupations. The dashed oval on Figure 1 shows the groups of individuals included in the SESTAT integrated database. There are other groups in the U.S. population that can be considered part of the population of scientists and engineers, for example persons in technical occupations without college degrees, who are not included in the SESTAT integrated database. The SESTAT system was developed to provide information on the bachelor's and above population of scientists and engineers, with emphasis placed on those trained at U.S. institutions.

The 1993 SESTAT integrated database represents 11,615,200 individuals. This included 11,021,500 persons with S&E degrees, and 593,600 persons without such degrees but working in S&E occupations (table 2).

Figure 1. The SESTAT Population


S&E degree status
Labor force status
S&E occupational status
SESTAT Integrated Database
A: All College Graduates in the U.S. (bachelor's and above)
B: At least one science or engineering degree
C: No science or engineering degree
D: Not in labor force
E: Unemployed
F: Employed
G: Employed
H: Unemployed
J: Not in labor force
K: Has a non-S&E job
L: Has an S&E job
M: Has an S&E job
N: Has a non-S&E job

Note: Because after 1993 the SESTAT surveys identify individuals for inclusion at the point of earning an S&E degree from a U.S. institution, two subpopulations of scientists and engineers in the United States are underrepresented in the SESTAT integrated database in 1995 and subsequent survey years: (1) new immigrants with S&E degrees earned outside the U.S. who entered the U.S. labor force after 1990, and (2) people with no S&E degrees working in S&E occupations after 1990 (Box M in the diagram). There are other individuals who could be considered part of the population of scientists and engineering, for example person in technical occupations with two-year degrees or other types of training. These individuals are not included in the SESTAT integrated database, nor are they represented in this diagram.

SOURCE: National Science Foundation, Division of Science Resources Studies.

Table 2: SESTAT integrated database population statistics

1993 SESTAT integrated database

S&E degree status	Total	Labor Force				Not in labor force
		Employed			Unemployed	
		Total	In S&E	In non-S&E		
Total SESTAT population	11,615,200	9,793,500	3,303,400	6,490,100	322,200	1,499,500
Educated in S&E	11,021,500 (Fig. 1, Box B)	9,199,900 (Fig. 1, Box F)	2,709,800 (Fig. 1, Box L)	6,490,100 (Fig. 1, Box K)	322,200 (Fig. 1, Box E)	1,499,500 (Fig. 1, Box D)
Highest degree is in S&E	8,571,000	7,035,800	2,517,800	4,518,000	272,500	1,262,600
Highest degree is in non-S&E	2,450,600	2,164,100	192,000	1,972,100	49,600	236,900
No S&E degree	593,600	593,600	593,600 (Fig. 1, Box M)	0	0	0

1995 SESTAT integrated database

S&E degree status	Total	Labor Force				Not in labor force
		Employed			Unemployed	
		Total	In S&E	In non-S&E		
Total SESTAT population	12,036,200	10,114,500	3,185,600	6,928,900	249,300	1,672,400
Educated in S&E	11,456,600 (Fig. 1, Box B)	9,570,000 (Fig. 1, Box F)	2,851,400 (Fig. 1, Box L)	6,718,600 (Fig. 1, Box K)	237,700 (Fig. 1, Box E)	1,649,000 (Fig. 1, Box D)
Highest degree is in S&E	8,908,000	7,333,100	2,634,900	4,698,200	197,400	1,377,600
Highest degree is in non-S&E	2,548,600	2,236,900	216,600	2,020,400	40,300	271,400
No S&E degree*	579,600	544,400	334,100 (Fig. 1, part of Box M)	210,400 (Fig. 1, part of Box N)	11,600 (Fig. 1, part of Box H)	23,400 (Fig. 1, part of Box J)

* The 245,400 persons without S&E degrees or jobs in the 1995 integrated database represent individuals who had S&E jobs in 1993, but by 1995 had moved to non-S&E jobs, become unemployed, or had moved out of the labor force. Although these cases are shown in the SESTAT integrated database, they no longer fit the population of individuals either educated in S&E or working in S&E. These individuals, along with the 334,100 persons in the 1995 integrated database without S&E degrees but still working in S&E jobs are part of a panel of individuals that are being followed throughout the 1990s. The latter group is described in figure 1 as "Box M", and is underrepresented in the SESTAT database after 1993 because the SESTAT surveys do not capture new persons entering S&E occupations who are not educated in S&E fields in this decade. The SESTAT surveys only cover persons who earned S&E degrees outside of the U.S. if they were residing in the country in 1990. Persons who earned S&E degrees outside of the U.S. and then entered after that time are not covered in the SESTAT integrated database.

SOURCE: National Science Foundation, Division of Science Resources Studies.

The 1995 SESTAT integrated database represents 12,036,200 individuals: 11,456,600 with S&E degrees; 334,100 persons without such degrees but working in S&E occupations, and 245,400 persons without S&E degrees or jobs.[2]

Approximately 84 percent of the individuals in the 1993 and 1995 SESTAT integrated databases (9,793,500 and 10,114,500, respectively) were employed. Among this group, about one-third were employed in science or engineering occupations (3,303,400 in 1993 and 3,185,600 in 1995). Individuals in this group are often referred to as those working in S&E. The remaining individuals were either unemployed, but seeking work (322,200 in 1993 and 249,300 in 1995) or were not in the labor force (1,499,500 in 1993 and 1,672,400 in 1995).

Many of the individuals in the 1993 and 1995 integrated databases hold either multiple S&E degrees or have degrees in both S&E and non-S&E fields. There were 11,021,500 individuals in 1993 who were educated in S&E; that number had risen to 11,456,600 by 1995. Approximately three-fourths of these individuals reported that their highest degree was in an S&E field (8,571,000 in 1993 and 8,908,000 in 1995).[3]

Many workers educated in S&E routinely find occupations in non-S&E fields. Roughly 70% of all S&E-educated individuals in the labor force were employed in non-S&E occupations (6,490,100 in 1993 and 6,718,600 in 1995). Conversely, but to a lesser extent, non-S&E educated individuals are employed in S&E occupations. In 1993, there were 593,600 non-S&E educated persons working in S&E occupations. In 1995, the SESTAT integrated database included only 334,100 persons in this category.[4]

[2] The 245,400 persons without S&E degrees or jobs in the 1995 integrated database represent individuals who had S&E jobs in 1993, but by 1995 had moved to non-S&E jobs, become unemployed, or had moved out of the labor force. Although these cases are shown in the SESTAT integrated database, they no longer fit the population of individuals either educated in S&E or working in S&E. These individuals, along with the 334,100 persons in the 1995 integrated database without S&E degrees but still working in S&E jobs are part of a panel of individuals that are being followed throughout the 1990s. The latter group is described in figure 1 as "Box M", and is underrepresented in the SESTAT database after 1993 because the SESTAT surveys do not capture new persons entering S&E occupations who are not educated in S&E fields in this decade.

[3] For individuals with two or more degrees at the same highest degree level (bachelor's, master's, doctorate, professional), the field of the most recently earned degree is considered the highest degree field.

[4] See footnote 2.

What Can We Find Out about Scientists and Engineers Using SESTAT?

There is a wide range of information on scientists and engineers contained in SESTAT. Listed here are examples of the variables found in the SESTAT integrated database.

Labor Force Information

For the employed:

- Primary job and salary
- If previously retired
- Type of employer: educational institution (by type); private for-profit; private not-for-profit; government (state/local or federal); self-employed
- Supervisory responsibility, including number typically supervised directly and through subordinates
- Relationship between work and highest degree, including reasons for employment outside the highest degree field
- Typical work activities (in 14 categories), including primary and secondary work activities
- Licensing and certification if required, recommended, or held
- U.S. government support for research, including supporting agencies or departments
- Second job, including occupation, salary, and relationship between work and highest degree field

For the unemployed and those not in the labor force:

- Reasons for not working during the reference week
- When last worked
- Job last worked

Other Work-Related Information

- Membership in professional societies and associations, including meeting attendance
- Participation in work-related training activities, including types of training and reasons for participation

Education

- First bachelor's and two most recent degrees — level, degree field (major and minor), when awarded
- Earlier education — date awarded high school diploma; associate degree(s)
- Continuing education — post-degree college courses, reasons and field of study; employer financing

Other Information

Family-related:

- Marital status
- Spouse's employment status; if working full/part-time, technical expertise required on job
- Children living at home (and ages)
- Parents' educational attainment

Demographics:

- Citizenship status (by type)
- Age
- Race/ethnicity
- Sex
- Disability
- Country of birth

Special modules

1993: Labor force status in 1988

- Type of employer and job
- If different from current job, reasons for changing employer or job
- Years of professional work experience

1995 (SDR only): Post-doctoral experience

- Whether ever held a post-doctoral position
- Number of post-docs held over career
- Type of employer, including types of benefits offered
- Whether current job was a post-doctoral position

1995 (NSCG and SDR only): Patent and publication activity

- Number of articles or other publications authored by respondent
- Number of patent applications, patents awarded and commercializations attributed to respondent

1997: Alternative or temporary work experience

- Whether relationship to employer was alternative or temporary (consulting, contracting, etc.)
- Reasons for such work arrangements
- Whether benefits were provided, and if so, types of benefits

How Can An Analyst Use SESTAT?

SESTAT is useful not only for describing the characteristics of the U.S. scientists and engineers, but also for answering questions about this group. For example, it can be used to describe the educational background of engineers or social scientists. Analysts can use the system to show what occupations people with physics degrees hold. It can also be used to answer questions such as how age or gender are related to salary distributions for scientists or engineers working in different fields or with different degrees. SESTAT is intended to support this type of research, for both policy analysis and general information.

The Division of Science Resources Studies has produced a variety of analyses that show the capability of SESTAT for analyzing characteristics and issues about the U.S. population of scientists and engineers, including the following examples:

- Two Issue Briefs, *"Degrees and Occupations in Engineering: How Much Do They Diverge?"* (NSF 99-318), and *"How Much Does the U.S. Rely on Immigrant Engineers?"* (NSF 99-327), and the topical report, *The Education and Employment of Engineering Graduates* (forthcoming), examine individuals within a certain disciplinary field or occupational category.

- The Issue Brief, *"What Follows the Postdoctorate Experience? Employment Patterns of 1993 Postdocs in 1995"* (NSF 99-307) uses data from two rounds of one of the SESTAT surveys, the SDR, to examine individuals with doctorates earned at U.S. institutions.

- SDR data was also used to explore unemployment in the Issue Brief, *"Is The Gender Gap In Unemployment Disappearing?"* (NSF 97-323).

- Salary differences among recent bachelor's and master's degree earners from the NSRCG were the subject of the Data Brief, *"Recent Engineering Graduates Out-Earn Their Science Counterparts"* (NSF 96-327).

- SESTAT has also been used to examine individuals with certain labor market characteristics. For example, recent bachelor's and master's degrees earners working in small businesses are the subject of the topical report, *Will Small Business Become the Nation's Leading Employer of Graduates with Bachelor's Degrees in Science and Engineering?* (NSF 99-322).

- The SESTAT population has been used to highlight aspects of the workforce of scientists and engineers. All individuals employed as scientists and engineers were discussed in the Data Brief,

"Employment of Scientists and Engineers Reaches 3.2 Million in 1995" (NSF 98-325).

The concepts used to develop the SESTAT integrated database are broad and general in order to provide the capability for flexible and customized analyses. As such, SESTAT users may tailor their inquiries and research to address a variety of issues about the population of scientists and engineers.

The SESTAT system is available to the public on the World Wide Web at http://sestat.nsf.gov. This site contains public use versions of the SESTAT integrated databases for 1993 and 1995, as well as a public use version of the 1993 NSCG database. The 1997 integrated database will be available in Spring 1999. The National Science Foundation ensures the confidentiality of all of the data collected and available in the SESTAT system.

APPENDIX A

APPENDIX A

DEGREE FIELDS AND OCCUPATIONAL CATEGORIES IN SESTAT

SESTAT uses six broad educational fields and six broad occupational categories with these fields and categories further subdivided (appendix table 1).

Appendix Table 1. SESTAT educational fields and occupational categories

Major educational field	Minor groups of disciplines, and subdisciplines	Major occupational category	Minor categories of occupations, and subcategories
SCIENCE AND ENGINEERING			
Computer & Mathematical Sciences	**Computer & information sciences**	**Computer & Mathematical Scientists**	**Computer & Information Scientists**
	Computer & information sciences		Computer systems analysts
	Computer science		Computer scientists, except systems analysts
	Computer systems analysis		Information systems scientists & analysts
	Information services & systems		Other computer & information science occupations
	Other computer & information sciences		Computer engineers - software
	Mathematical Sciences		**Mathematical Scientists**
	Applied mathematics		Mathematicians
	Mathematics, general		Operations research analysts, modelling
	Operations research		Statisticians
	Statistics		Other mathematical scientists
	Other mathematical sciences		
			Postsecondary teachers - computer & mathematical sciences
			Postsecondary teachers - computer science
			Postsecondary teachers - mathematics
Life & related sciences	**Agricultural & food sciences**	**Life Scientists**	**Agricultural & food scientists**
	Animal sciences		Agricultural & food scientists
	Food sciences & technology		
	Plant sciences		**Biological scientists**
	Other agricultural sciences		Biochemists & biophysicists
			Biological scientists
	Biological Sciences		Medical scientists, except practitioners
	Biochemistry & biophysics		Other biological & life scientists
	Biology		
	Botany		**Environmental life scientists**
	Cell & molecular biology		Forestry & conservation scientists
	Ecology		
	Genetics, plant & animal		**Postsecondary teachers - life & related sciences**
	Microbiology		Postsecondary teachers - agriculture
	Nutritional science		Postsecondary teachers - biological science
	Pharmacology, human & animal		Postsecondary teachers - medical science
	Physiology, human & animal		Other postsecondary teachers - natural science
	Zoology		
	Other biological sciences		
	Health & related (these fields are included under the life sciences for doctoral programs only)		
	Audiology & speech pathology		
	Health services administration		
	Health & medical assistants		
	Health & medical technologies		
	Medical preparatory programs		
	Medicine		
	Nursing, 4 years or longer programs		

See explanatory information and SOURCE at end of table.

Appendix Table 1. SESTAT educational fields and occupational categories

Major educational field	Minor groups of disciplines, and subdisciplines	Major occupational category	Minor categories of occupations, and subcategories
SCIENCE AND ENGINEERING (continued)			
	Pharmacy		
	Physical therapy & other rehab.		
	Public health, including environment		
	Other health & medical sciences		
	Environmental life sciences		
	Environmental science studies		
	Forestry services		
Physical & related sciences	**Chemistry, except biochemistry**	**Physical Scientists**	**Chemists, except Biochemists**
	Chemistry, except biochemistry		Chemists, except Biochemists
	Earth science, geology & oceanography		**Earth scientists, geologists & oceanographers**
	Atmospheric sciences & meteorology		Atmospheric & space scientists
	Earth sciences		Geologists
	Geology		Oceanographers
	Other geological sciences		
	Oceanography		**Physicists & astronomers**
			Astronomer
	Physics & Astronomy		Physicists
	Physics		
	Astronomy & astrophysics		**Other physical scientists**
			Other physical & related scientists
	Other physical sciences		
	Other physical & related sciences		**Postsecondary teachers - physical & related sciences**
			Postsecondary teachers - chemistry
			Postsecondary teachers - physics
			Postsecondary teachers - earth, environmental, & marine science
Social & related sciences	**Economics**	**Social Scientists**	**Economists**
	Agricultural economics		Economists
	Economics		
			Political & related scientists
	Political & related sciences		Political & related scientists
	Public policy studies		
	International relations		**Psychologists**
	Political science and government		Psychologists
	Psychology		**Sociologists & anthropologists**
	Educational psychology		Anthropologists
	Clinical psychology		Sociologists
	Counseling psychology		
	Experimental psychology		**Other social & related scientists**
	Psychology, general		Historians, science & technology
	Industrial and organizational psychology		Other social scientists
	Social psychology		
	Other psychology		**Postsecondary teachers - social sciences**

See explanatory information and SOURCE at end of table.

Appendix Table 1. SESTAT educational fields and occupational categories

Major educational field	Minor groups of disciplines, and subdisciplines	Major occupational category	Minor categories of occupations, and subcategories
	SCIENCE AND ENGINEERING (continued)		
	Sociology & anthropology		Postsecondary teachers - economics
	Anthropology & archaeology		Postsecondary teachers - political science
	Criminology		Postsecondary teachers - psychology
	Sociology		Postsecondary teachers - sociology
	Area & ethnic studies		Postsecondary teachers - other social sciences
	Linguistics		
	Philosophy of science		
	Geography		
	History of science		
	Other social sciences		
	Other social sciences		
Engineering	**Aerospace & related engineering**	**Engineers**	**Aerospace & related engineers**
	Aerospace, aeronautical & astronautical		Aerospace & related engineers
	Chemical engineering		**Chemical engineers**
	Chemical engineering		Chemical engineers
	Civil & architectural engineering		**Civil & architectural engineers**
	Architectural engineering		Civil engineers
	Civil engineeirng		
			Electrical & related engineers
	Electrical & related engineering		Computer engineers - hardware
	Computer & systems engineering		Electrical & electronics engineers
	Electrical, electronics & communications engineering		
			Industrial engineers
	Industrial engineering		Industrial engineers
	Industrial engineering		
			Mechanical engineers
	Mechanical engineering		Mechanical engineers
	Mechanical engineering		
			Other engineers
	Other engineering		Agricultural engineers
	Agricultural engineering		Bioengineers & biomedical engineers
	Bioengineering & biomedical engineering		Environmental engineers
	Engineering sciences, mechanics and physics		Marine engineers or naval architects
	Environmental engineering		Materials & metallurgical engineers
	Engineering, general		Mining & geological engineers
	Geophysical engineering		Nuclear engineers
	Materials engineering, including ceramics & textiles		Petroleum engineers
	Metallurgical engineering		Sales engineers
	Mining & minerals engineering		Other engineers
	Naval architecture and marine engineering		
	Nuclear engineering		**Post-Secondary teachers - engineering**
	Petroleum engineering		Postsecondary teachers - engineering
	Other engineering		

See explanatory information and SOURCE at end of table.

Appendix Table 1. SESTAT educational fields and occupational categories

Major educational field	Minor groups of disciplines, and subdisciplines	Major occupational category	Minor categories of occupations, and subcategories
NON-SCIENCE AND ENGINEERING			
Non-S&E disciplines	**Management & administration**	**Non-S&E occupations**	**Managers & administrators**
	Agricultural business & production		Top and mid-level managers, executives, administrators
	Accounting		Accountants, auditors, & other financial specialists
	Business administration & management		Personnel, training & labor relations specialists
	Business, general		Other management related occupations
	Business & managerial economics		
	Financial management		**Health related occupations**
	Other business management/administrative services		Diagnosing & treating health practitioners
			Registered nurses, pharmacists, dieticians, therapists, etc.
	Health & related (these fields are included in Non-S&E for bachelor's and master's programs only)		Health technologists & technicians
			Other health occupations
	Audiology & speech pathology		
	Health services administration		**Teachers, except S&E postsecondary teachers**
	Health & medical assistants		Teachers - pre-kindergarden & kindergarden
	Health & medical technologies		Teachers - elementary school
	Medical preparatory programs		Teachers, secondary - computer, mathematics or science
	Medicine		Teachers - social sciences
	Nursing, 4 years or longer programs		Teachers - other subjects
	Pharmacy		Teachers - special education
	Physical therapy & other rehab.		Teachers - other precollegiate education
	Public health, including environment		
	Other health & medical sciences		**Non-S&E postsecondary teachers**
			Postsecondary teachers - art, drama, & music
	Teaching & Education		Postsecondary teachers - business, commerce, & marketing
	Education administration		Postsecondary teachers - education
	Computer teacher education		Postsecondary teachers - English
	Counselor education & guidance		Postsecondary teachers - foreign language
	Elementary teacher education		Postsecondary teachers - history
	Mathematics teacher education		Postsecondary teachers - home economics
	Physical education & coaching		Postsecondary teachers - law
	Pre-elementary teacher education		Postsecondary teachers - physical education
	Science teacher education		Postsecondary teachers - social work
	Secondary teacher education		Postsecondary teachers - theology
	Special education		Postsecondary teachers - trade & industrial
	Social science teacher education		Postsecondary teachers - other health specialties
	Other education		Postsecondary teachers - other, non-S&E not listed above
	Social service & related		**Social services & related occupations**
	Social work		Clergy & other religious workers
	Other philosophy, religion, theology		Counselors, educational & vocational
			Social workers
	Technology & technical		
	Computer programming		**Technologists & technicians**
	Data processing technology		Technologists & technicians in biological & life sciences
	Electrical & electronics technologies		Computer programmers

See explanatory information and SOURCE at end of table.

Appendix Table 1. SESTAT educational fields and occupational categories

Major educational field	Minor groups of disciplines, and subdisciplines	Major occupational category	Minor categories of occupations, and subcategories
NON-SCIENCE AND ENGINEERING (continued)			
	Industrial production technologies		Electrical, electronics, industrial, & mech. eng. techs.
	Mechanical engineering-related technologies		Drafting occupations
	Other engineering-related technologies		Surveying & mapping engineering technicians
			Other engineering technologists & technicians
	Sales & marketing		Surveyors
	Business marketing/marketing management		Technologists & technicians in mathematical sciences
	Marketing research		Technologists & technicians in physical sciences
	Arts, humanities & related		**Sales & marketing occupations**
	English language, literature & letters		Sales/mrktg - insurance, securities, real estate & business services
	Other foreign languages & literature		Sales occupations - commodities, except retail
	Liberal arts & general studies		Sales occupations - retail
	History		Other marketing & sales occupations
	Dramatic arts		
	Fine arts		**Art, humanities & related occupations**
	Music		Artists, editors, entertainers, public relations, writers
	Other visual & performing arts		Historians, except science & technology
	Other non-S&E		**Other non-S&E occupations**
	Artchitecture & environmental design		Accounting clerks & bookkeepers
	Other conservation, renewable natural resources		Secretaries, receptionists & typists
	Actuarial science		Other administrative
	Communications		Architects
	Journalism		Farmers, foresters & fishermen
	Other communications		Lawyers & judges
	Criminal justice & protective services		Librarians, archivists & curators
	Home economics		Actuaries
	Law, pre-law, legal studies		Food preparation & service workers
	Library science		Protective service workers
	Parks, recreation, leisure, & fitness studies		Other service occupations, except health
	Public administration		Construction trades, miners & well-drillers
	Other public affairs		Mechanics & repairers
	Other fields not listed		Precision production occupations
			Operators & related occupations
			Transportation & material-moving occupations
			Other occupations

NOTE: The individual occupations included in SESTAT adhere to the Standard Occupational Classification (SOC), a U.S. government standard classification scheme. The SOC was developed through an interagency committee headed by the Office of Management and Budget. It is used by all the Federal agencies that collect employment and occupational data, and was meant to provide comparability of data among different Federal statistical agencies. The major and minor science and engineering groupings of occupations as shown on this table were developed by the National Science Foundation.

SOURCE: National Science Foundation, Division of Science Resources Studies.

APPENDIX B

APPENDIX B

RESPONDENT POPULATION SIZE AND RESPONSE RATES

Over 100,000 individuals responded to one of the three SESTAT surveys in 1993 and 1995. Respondent populations sizes are shown in appendix table 2. Response rates for the SESTAT component surveys are shown in appendix table 3.

Appendix Table 2. Number of cases by survey

Survey	1993		1995	
	Unweighted Cases	Weighted Cases	Unweighted Cases	Weighted Cases
***SESTAT Integrated Database**	**126,721**	**11,615,200**	**104,616**	**12,036,200**
NSCG (full)	148,298	29,021,500	N/A	N/A
NSCG (S&E panel)	74,462	10,953,100	53,448	10,724,200
NSRCG	19,426	973,400	16,338	841,000
SDR	39,495	513,600	35,370	542,500

*The integrated database is constructed by adding the cases from the NSCG (S&E panel), the NSRCG and the SDR. The number of cases from the individual surveys does not add to integrated database total due to overlap between some of the cases.

SOURCE: National Science Foundation, Division of Science Resources Studies.

Appendix Table 3. Weighted response rates

Survey	1993	1995
*NSCG	80%	95%
NSRCG	84%	83%
SDR	87%	85%

*The response rate for the NSCG in 1993 includes all the respondents (S&E and non-S&E). In 1995, the response rate is that for the NSCG S&E panel.

SOURCE: National Science Foundation, Division of Science Resources Studies.

APPENDIX C

APPENDIX C

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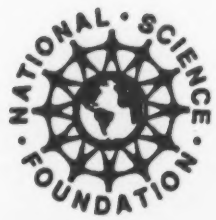

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